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INTERNATIONAL RELATIONS AND SPACE

James E. Webb
Administrator
National Aeronautics and Space Administration

1961 Annual Meeting of The American Political Science Association, St. Louis, Mo., Sheraton-Jefferson Hotel
September 6 - 9, 1961

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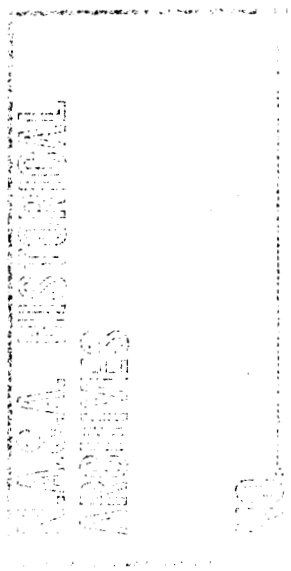
President Kennedy
State of the Union Message
May 25, 1961



I

EMERGING ROLE OF SPACE SCIENCE AND TECHNOLOGY

Space exploration is bringing a new dimension to international affairs. In so doing, it is also providing a new instrumentality, knowledge, that will be more and more persuasive in the battle for men's minds. Early ventures into space are already influencing world opinion and international policy. As the pace and extent of exploration of the solar system increases, the manner in which knowledge derived from space is put to use could well become an important political factor in the struggle between the Free Nations and the Communist bloc.

U.S. Policy

The United States is conducting its space experiments in the open. We are sharing our discoveries with the world scientific community. We are cooperating with a growing number of nations in a variety of projects to increase knowledge of the earth's environment and of the universe.

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The concept of wide dissemination of knowledge is characteristic of democracy and of science. Moreover, in today's interlinked world such a policy must eventually prove as sound a one in the practical sense as it is morally. In its very essence, science is international; its sources and its reach are as widespread as human intelligence and human needs for its benefits. No way has yet been devised to padlock the dynamism of science and technology permanently. Thus, a closed-door policy on purely scientific knowledge is in the long run much more apt to exclude valuable contributions from outside than to pen worthwhile discoveries inside. Such a policy could result, at some crucial point, in a surplus of yesterday's hardware and a scarcity of tomorrow's ideas.

The United States stands to gain contributions from gifted minds in scores of countries through its mutual-aid space programs and interchange of ideas with scientists and scientific organizations of other nations.

These considerations, based on long American practice as well as on recognition of the character of modern science, guided the 85th Congress when it charted the mission of the National Aeronautics and Space Administration (NASA) in 1958.

In setting forth NASA objectives, Congress also bore in mind a then-current, highly successful example of research cooperation on a global scale -- the International Geophysical Year, an 18-month period (1957-1958) during which 60,000 scientists of 66 nations participated in the most intensive study ever undertaken of the make-up of the earth and its environment.

II

NASA ORGANIZATION AND MISSION

Statutory International Cooperation

Public Law 85-568, which established the civilian national space program, stipulated that this country's space activities "should be devoted to peaceful purposes for the benefit of all mankind." This aim was further spelled out to include: "Cooperation by the United States with other nations and groups of nations in work done pursuant to this Act and in peaceful applications of the results thereof." The Act also specified the widest practicable dissemination of information on civilian space activities and their results.

Background and Accomplishments

At its birth on October 1, 1958, NASA absorbed the National Advisory Committee for Aeronautics (NACA) which for 43 years had been at the forefront of aviation research and which had also played an important role in early U.S. space research. To the 8,000 NACA scientists, engineers, and technical and administrative personnel utilizing five field centers, other excellent groups were added. Among these were the staff members of the Naval Research Laboratory Vanguard group which joined NASA in November 1958, and the approximately 2,400 people of the Jet Propulsion Laboratory, operated under NASA contract by the California Institute of Technology since December 3, 1958. On July 1 of last year, more than 5,000 staff members of the Development Operations Division, Army Ballistic Missile Agency, Huntsville, Alabama, were added. Today, NASA's

total employee strength -- excluding The Jet Propulsion Laboratory -- is approximately 17,400, and by this time next year the agency plans on a strength of about 21,400.

NASA now has an all-around space research and development capacity and a budget for Fiscal Year 1962 of $1,671,750,000.

Space Sciences Program Highlights

NASA's space science program, which is carried out with satellites, space probes, and sounding rockets, consists of studies of the earth and its environment -- geophysics -- and of the sun, stars, and universe -- astronomy.

In geophysics, research is focused on the atmosphere and ionosphere and on energetic particles. These are atomic particles moving at very high speeds, thus possessing great amounts of energy. They include the particles forming the Great Radiation Regions surrounding the earth, cosmic rays, and the particles involved in auroras.

Since January 31, 1958 -- and as of this writing -- the United States has successfully launched 46 earth satellites, two solar satellites, and two deep space probes. The most recent is Explorer XII, which is making simultaneous measurements of many aspects of the space environment between altitudes of about 200 and 50,000 miles. All have provided important new scientific knowledge which has brought space into sharper focus and has contributed to the technology needed for more advanced spacecraft to come. The flights of these experiments have been traced by tracking stations abroad as well as by those located in the United States. Foreign scientists have participated to varying degrees in most of the experiments.

Some of the scientific findings are:

...Discovery of two intense radiation zones trapped around the earth -- the Van Allen Belts. It has also been discovered that radiation from the sun significantly affects our weather.

...Determination that the earth is slightly pear-shaped with the stem at the North Pole. Other measurements by means of U.S. satellites have resulted in more accurate mapping of island and continent masses on earth.

...New data regarding the makeup of the fields of magnetism in space. For example, Explorer X, a 78-pound NASA satellite, transmitted highly meaningful information on solar-terrestrial relationships -- such as magnetic fields and solar winds. Explorer X's data indicate that part of the interplanetary magnetic field near the earth may be an extension of the sun's magnetic field which has been carried earthward by solar winds.

...Discovery that sunlight exerts pressure on objects in space. This pressure is shifting the orbit of the grapefruit-sized Vanguard I satellite about a mile per year and has affected the orbit of the 100-foot-diameter Echo I satellite at a rate 300 times greater.

Among NASA's most successful experiments to date have been the Pioneer series of space probes. Pioneer V, for example -- launched into solar orbit on March 11 last year -- was tracked into space to a distance of 22.5 million miles, still the greatest distance any man-made object has been tracked. Pioneer V sent back scientific data on conditions in space until communication contact was lost on June 26, 1960. This space probe transmitted new and valuable information about cosmic rays, the earth's magnetic field, solar "storms," and evidence of the existence of a large "ring current" circulating around the earth at altitudes from about 30,000 to 60,000 miles.

In addition, NASA's family of sounding rockets -- which reach altitudes of from 150 to 4,000 miles -- have been accumulating quantities of data on atmosphere composition and pressure, upper atmosphere winds, cloud cover, the makeup of the ionosphere, etc. During the coming 12 months NASA will be launching more than 300 sounding rockets from sites in this country, and will cooperate with other nations in sounding-rocket launchings abroad.

Advanced launch vehicles, such as the Agena and the Centaur, will soon be available to NASA. They will have greatly improved load-carrying capabilities. Detailed plans have been made and work has begun on an Orbiting Geophysical Observatory (OGO), based on use of the Agena launch vehicle. OGO will be one of NASA's first standardized satellites, with a stock-model structure, basic power supply, attitude control, telemetry, and a command system. Its compartments will accommodate 50 different geophysical experiments on a single mission. The observatory itself will be about six feet long by three feet square. The two solar "paddles" which collect energy from the sun will each be about six feet square. The satellite will weight 1,000 pounds, including 150 pounds of scientific experiments.

NASA has well-advanced plans for unmanned, then manned, exploration of the moon. A lunar spacecraft -- known as Ranger -- has been designed to carry an instrument package built ruggedly enough to survive a crash landing on the moon, after which the instruments will record and radio to earth data on the makeup of the lunar surface.

Following Ranger will come Surveyor, a spacecraft designed to make a so-called "soft landing" on the moon. More delicate scientific instruments than those in Ranger can thus be employed.

Under NASA development also is Mariner, an instrument-packed spacecraft that will skirt Venus and Mars. Later, perhaps, Mariner spacecraft will be dispatched on missions approaching more remote planets in the solar system. Mariner will be equipped with devices to measure planetary atmospheres, surface temperatures, rotation rates, magnetic fields, and surrounding radiation regions. Centaur vehicles will launch the Mariner series.

Manned Spaceflight

The historic flights of American Astronauts Alan Shepard and Virgil Grissom on May 5 and July 21, respectively, were too recent and too minutely reported for details to be repeated here. These missions were advanced steps in Project Mercury, the first phase in the United States program for manned spaceflight. The main goal of Project Mercury is to determine man's capabilities under the alien conditions of acceleration and weightlessness with which future voyagers to the moon and planets will have to cope.

Shepard and Grissom were not sent on their brief space trips merely to bolster the prestige of the United States. Theirs were research flights, planned and made to test the combination of man-and-Mercury systems and to learn to what extent trained human ability could manage Mercury-capsule control during actual flight in space.

The results proved gratifying. Despite the mishap and loss of the capsule after the second Mercury flight reached its successful sea landing, NASA is convinced that the planned schedule for orbiting one of the astronauts late this year, or early in 1962, can be met.

As the world noted, the suborbital Mercury flights were conducted openly. During the flights and after, there was a continuous flow of information to the press and to scientists. This was in strong contrast to the

flights of Soviet Cosmonauts Gagarin and Titov which were launched in secret and, so far, have yielded to the world only sketchy information.

The first Mercury manned orbital mission will circle the earth three times to test pilot and capsule for about four and one-half hours. A prime purpose is to study how weightlessness will affect a human being during such a long period. The Mercury capsule will return to earth in a manner similar to the technique used in suborbital flights. NASA plans to send several manned Mercury capsules on as many as 18 orbits each during the next two years.

Mercury tests and those for the next generation of manned spacecraft -- Project Apollo -- will probably overlap. The Apollo spacecraft will be several times larger than the Mercury capsule. It will provide living and working quarters roomy enough to accommodate three men who will be able to move around without space suits in what NASA scientists call a "shirt-sleeves environment." The Apollo spacecraft will be carried aloft by the Saturn booster, an eight-cluster rocket with a thrust of 1,500,000 pounds, compared to the Atlas with 360,000 pounds of thrust and the Redstone with only 78,000 pounds. The Redstone was used for the Shepard and Grissom flights. The Atlas will be the booster for Mercury orbital flights.

The Apollo-Saturn combination will first be used for an earth satellite, an orbiting space laboratory in which the three-man team can perform a great variety of scientific experiments while training for sustained spaceflight. Next will come voyages deep into space toward the moon and, in time, a three-man voyage around the moon and return to earth.

An actual moon landing may be feasible late in this decade. NASA's F-1 liquid-fuel rocket for the booster is now completed and is being tested. This engine, developing 1.5-million pounds of thrust, will be clustered into a super booster -- the Nova -- to power moon expeditions. The design for Nova and for the Apollo spacecraft are under active study.

III

SATELLITE APPLICATIONS

Space itself, when instrumented by man, will feed back large returns to the world economy. Early dividends from NASA experiments are already within reach in the fields of weather and communications satellites.

Project Echo

In 1960, NASA's Echo I passive communications satellite appealed to the world's imagination. The hugh aluminized plastic sphere has been seen sparkling like a moving star by people in practically every country. Echo proved that it is possible to communicate between distant areas on the earth by reflecting radio signals from a satellite. Private companies have shown great interest in the Echo concept, and in "repeater" satellites -- which the Government is developing -- that can receive and store messages at one point over the earth's surface and re-transmit them to ground receiving stations thousands of miles apart. Satellite communications will make world-wide telephone and television service realities, and will relieve the overload on present global communications systems. This enhanced communication could well be a bond drawing people of the world closer together.

Gen. David Sarnoff, chairman of the Radio Corporation of America, predicts: "Ten years hence there will be TV stations in virtually every nation on the earth. An audience of a billion might then be watching the same program at the same time. The instrument which will give television's second epoch this distinctive global character is satellite relay transmission."

According to Dr. Lloyd V. Berkner, chairman of the Space Science Board of the National Academy of Sciences, satellites can increase present world communications capacity by a factor of 10,000.

Project TIROS

NASA is developing meteorological satellites to provide worldwide observation of atmospheric elements -- the data meteorologists must have to understand atmospheric processes and to predict the weather. TIROS I, launched April 1, 1960, was the first step toward an operational meteorological satellite system. The highly successful satellite, orbiting at altitudes averaging 450 miles, transmitted 22,952 television pictures of the earth's cloud patterns. This afforded meteorologists unprecedented opportunities to relate the earth's cloud cover to weather observations from the ground.

Within 60 hours after the first TIROS was in orbit, its reports were being applied to day-to-day weather forecasting. In Hawaii, TIROS pictures helped trace the monsoons. Data on storms in the Indian Ocean were used by Australian meteorologists.

TIROS II, launched last November, reported important information about the atmosphere and the radiation of solar heat back from the earth into space.

NASA is receiving excellent cloud pictures and infrared data from the weather satellite TIROS III, launched July 12. Orbited to coincide with the hurricane season, the satellite has been gathering information on the origin, development, and movement of these massive tropical storms. The Weather Bureau has employed TIROS III pictures to help analyze and track Storm Eliza in the Pacific and Hurricane Anna in the Atlantic.

Japanese weathermen have made good use of TIROS III data supplied by the U. S. Weather Bureau. According to the chief of Japan's weather bureau, the information was valuable in plotting tropical storms. He stated that weather satellites would open a new era in forecasting typhoons, from which Japan has suffered so heavily in the past.

NASA used TIROS III for weather support of Astronaut Grissom's July 21 Mercury suborbital flight. Twice a day as the satellite passed over the Caribbean, one of its two TV cameras was triggered to report weather conditions in the area of the flight.

According to the House Committee on Science and Astronautics, "An improvement of only 10 percent in accuracy (of weather forecasting) could result in savings totaling hundreds of millions of dollars annually to farmers, builders, airlines, shipping, the tourist trade, and many other enterprises."

IV

INTERNATIONAL PROGRAMS AND ACTIVITIES

NASA's international activities began shortly after the agency was organized. In November 1958, an Office of International Programs was established to plan programs and oversee their accomplishment.

International Satellite Projects

In March 1959, the United States pledged that it would support projects for orbiting individual experiments or complete satellite payloads, of mutual interest, prepared by scientists of other nations. Subsequently, NASA has repeated its readiness to make available launching vehicles, spacecraft, technical guidance, and laboratory support for valid scientific experiments or payloads developed by scientists abroad. Launching vehicles provided by NASA may be one of several types, including Scout, a versatile solid-propellant, four-stage rocket capable of earth-orbiting payloads of from 50 to 150 pounds.

The first satellites under this program are being prepared by the United Kingdom and Canada. The U.K. satellite will carry devices to study electron temperatures and concentrations in the ionosphere, and instruments to determine electron densities in the vicinity of the satellite, to measure solar radiation and correlate it with ionospheric phenomena, and to observe primary cosmic rays and study their interactions with the earth's magnetic field. The payload will weigh about 170 pounds; a Scout vehicle will launch it.

Experiments were selected by scientists of the United Kingdom in consultation with NASA scientists. U.K. scientists are building the experiments. They will also be responsible for data analysis. NASA will design, fabricate, and test the prototype and flight models.

Work on a second U.S.-U.K. satellite began recently.

The Canadian project centers around a "Topside Sounder" satellite, which will be employed to study the upper ionosphere by radio-echo sounding -- a technique, similar to radar, used for years to study the lower portions of the ionosphere. The nature of the ionosphere makes it impossible to obtain information about its upper reaches from the ground because radar pulses penetrate the region and continue on into space instead of reflecting back to earth. The Topside Sounder will be the first attempt to apply radio-echo sounding of the ionosphere's top surface from above. The satellite (which has been christened "Alouette" by Canada) is being funded and built by Canada. The United States will supply the Thor-Agena launching vehicle.

The first U.K.-U.S. satellite and the Canada-U.S. Alouette will both be launched by NASA early in 1962.

Several other governments have expressed interest in cooperative satellite projects.

NASA's design and test requirements for such projects call for the closest relationships between scientists of the participating nations. For example, in the satellite program with the United Kingdom, a joint U.S.-British working group meets regularly to resolve technical problems. A similar group of U.S. and Canadian scientists serves the Alouette Topside Sounder program.

International Sounding Rocket Program

Cooperative space research is by no means limited to expensive satellite projects. Much valuable information about the earth's atmospheric envolope and its near-space environment has been gained from experiments carried aloft by relatively cheap and uncomplicated sounding rockets.

NASA is cooperating with a number of nations which are conducting scientific investigations with sounding rockets. And discussions now in progress may lead to additional projects of this nature.

Typical of such programs is the joint NASA-Italian Space Committee sounding-rocket effort. In this program rockets are used to release glowing clouds of sodium vapor at altitudes of 50 to 120 miles to measure winds and temperatures at the fringes of the atmosphere. The information obtained not only has basic scientific value but contributes as well to better understanding of basic weather phenomena.

In January and April this year, there were sodium-vapor rocket launchings from Sardinia. More are planned for the near future. During the April series, coordinated launchings were made from NASA's Wallops Island Station and the information obtained is being compared.

The Italian Space Committee purchased the rockets and built the Sardinian launching site. It conducts the launchings there, provides the instruments to gather the data, and reduces it to usable form. NASA contributed the rocket launcher, the payloads, and technical advice throughout.

Sweden and Norway also have active sounding rocket programs in which NASA is cooperating and sharing in the scientific results. Sweden recently successfully launched the first rocket in this program. The activities of Sweden are directed toward learning more about night-glowing clouds at high altitudes, while Norway plans to study phenomena of the ionosphere above northern regions.

Australia's Woomera Range is the site of a unique three-nation effort, with Australians firing British Skylark rockets carrying NASA experiments to survey sources of ultraviolet radiation in Southern Hemisphere skies.

In other joint programs under consideration, NASA may contribute the rockets and the cooperating nations the payloads, or vice versa. The method of cooperation is flexible and total costs need not be great. For this reason, sounding rocket programs will probably continue to have a large role in cooperative space activities.

Guidelines

In formulating and carrying out cooperative satellite and sounding rocket projects, NASA observes these guidelines:

1. To insure that promise does not exceed fulfillment, NASA defines proposed international projects through informal technical discussion before entering into cooperative agreements. This procedure also makes certain that projects proposed have valid scientific content so that support, related to NASA's own programs, can be provided.

2. Proposals must be specific and reflect mutual interests and capabilities. Ideally, they are for experiments or other projects that NASA itself would carry out if the project were not to be done jointly.

3. Because many individual and agency interests are involved in space research abroad (as in this country), the importance of adequate, sustained support for costly programs requires that international projects be sponsored or supported centrally by the cooperating governments.

4. Early in the program, the role of United States financing in NASA's international programs had to be faced. It was decided that both political and scientific objectives would best be served if cooperative programs were carried out without exchange of funds between nations. Therefore, each nation funds the portion of a given cooperative program that represents commitments of its own personnel or material.

5. Scientific results of cooperative enterprises are made available to the scientific community, consistent with the interests of the prime experimenters in publishing the results of their own work.

Ground-Based Support

The most useful contribution to space research within the present capabilities of scientists abroad may for some time lie in supporting research conducted from the ground. A program of this type was arranged in connection with Project Echo. The first receipt of a transatlantic transmission from the U.S., employing Echo as a reflector, was reported by the French National Telecommunications Establishment. The first transatlantic voice message via the satellite was received in England. Surprisingly, representatives of the Soviet Academy of Sciences organized a visual tracking program and supplied a number of observations to the United States.

NASA organized a more extensive program jointly with the U.S. Weather Bureau in connection with TIROS II. Foreign weather services were invited to conduct local meteorological observations, synchronized with passes of the satellite, and to analyze and compare the data. Although TIROS II instrumentation difficulties restricted the program, an organizational precedent was established which was implemented this summar during a special nine weeks of international participation in the TIROS III satellite experiment.

NASA and the U.S. Weather Bureau planned the program to permit global meteorological observations by more than 100 weather services in synchronization with passes of TIROS III. It constitutes an important forward step toward developing an operational worldwide meteorological satellite system. In addition to this program, the Weather Bureau immediately transmits the results of its analyses of the TIROS photographs over international weather communications networks.

NASA and the Weather Bureau are also sponsoring an International Meteorological Satellite Workshop, November 13-22. Meteorologists from more than 100 foreign weather services have been invited to participate in lectures, laboratory sessions, and in visits to the TIROS satellite data receiving station at Wallops Island and to the Weather Bureau's Meteorological Satellite Laboratory.

Participation in Future Communications Satellite Experiments

Representatives of NASA, the British General Post Office, and the French Center for Communications have signed agreements for participation in NASA's coming Rebound and Relay satellite experiments. (Rebound is an advanced "passive" communications satellite of the Echo type. Relay is an "active" or "repeater" communications satellite noted earlier in this paper.) The British and French organizations have agreed to construct ground terminals at their own expense for receiving and transmitting telephone, telegraph, and television signals via the satellites.

Overseas Facilities

NASA operates, or has made arrangements to use, tracking and/or communications stations in 19 foreign countries.

Of 27 overseas facilities, nearly two-thirds are operated wholly or in part by local staffs. In several cases, governments of cooperating countries are footing the entire operating costs of their units in the NASA global network. To increase this kind of participation, NASA has instituted a training program for foreign tracking and communications station technicians.

Jodrell Bank, a giant British radio telescope facility of the University of Manchester, assists NASA in space experiments, under contract. The telescope maintained contact with Pioneer V until it was 22.5 million miles from earth. Jodrell Bank was the only tracking facility in the free world capable of receiving signals from Pioneer V's five-watt transmitter beyond about 10 million miles. It has been used to track all NASA satellites and space probes. Operation of Jodrell Bank has created wide interest abroad in the possibility of establishing advanced radio telescope programs -- particularly in France, Italy, Japan, and Germany. NASA is furnishing interested foreign agencies with design suggestions for building new radio-telescope tracking facilities.

Technical Training

Scientific groups entering space research may need technical advice and experience. A post-doctoral program, funded by NASA and administered by the National Academy of Sciences, makes it possible for foreign as well as U.S. scientists to pursue space-connected projects in this country. In another program, NASA is offering laboratory support and training for extended periods to qualified scientists sponsored by their governments.

International University Program

NASA has established a new International University Program for gifted graduate students from a number of countries. They will study and conduct research in the space sciences at U.S. universities. Pilot programs have been arranged at the State University of Iowa, the University of Minnesota, the University of Wisconsin, the University of Colorado, and Columbia University. Ten to 20 students will start their projects during the 1961-62 academic year. All major U.S. universities engaged in space sciences will be invited to participate in the full program, beginning with the 1962-63 academic year and involving more than 100 foreign students.

Data and Information Exchange

Scientific data from NASA space research is circulated internationally through:

1) Dispatch of preliminary technical information to COSPAR shortly after rockets and satellites are launched.

2) Regular transmittal of satellite orbit and observation data through the international SPACEWARN system.

3) Publication of preliminary scientific results and the deposit of results in the World Data Centers established during the International Geophysical Year.

4) Agreements with experimenters abroad to provide the results required.

5) Publication for world use, of telemetry calibrations where useful.

6) Exchanges of scientific personnel in support of cooperative activities.

Cooperation with International Organizations

NASA maintains close and effective liaison, either directly or through appropriate agencies, with international organizations to assure adequate consideration of United States interests and effective support for peaceful international cooperation. These organizations include the United Nations, COSPAR, NATO, and the regional organizations emerging for cooperative space efforts in Europe and Latin America.

Roles of COSPAR and the United Nations

In all NASA cooperative programs, prime experimenters are provided opportunities to publish their data. The data is made freely available through the Committee on Space Research (COSPAR) and the World Data Centers. As an organism of the scientific community, COSPAR serves to: focus the objectives of international space research programs, provide a forum for research coordination, and supply a mechanism for exchange of the information resulting.

On a governmental level, the principal forum for international cooperation in space activities is the United Nations. In 1959, an Ad Hoc Committee of the UN recommended that the UN consider: first, how it might facilitate international cooperation in space and second, what legal problems should be given attention. The legal problems that have been suggested relate to defining the limits and use of national air space, liability for damages, claims upon celestial bodies, and the like.

Opinions differ as to whether these questions are urgent. In any case, by July 1959 the Ad Hoc Committee noted that "countries throughout the world (have) proceeded on the premise of permissibility of the launching and flight of space vehicles which were launched (during the IGY), regardless of what territory they 'passed over' during the course of their flight through outer space." The Committee concluded, "that, with this practice, there may have been initiated the recognition or establishment of a generally accepted rule to the effect that, in principle, outer space, on conditions of equality, is freely available for exploration and use by all in accordance with existing or future international law or agreements."

More than 50 earth satellites have now been placed in orbit, repeatedly passing over the territory of every nation on earth. No permission was sought in advance; none was expressly given by any state.

On the extremely important question of reserving space for peaceful purposes, the United States has proposed that all nations agree to ban weapons of mass destruction from orbiting satellites. However, consideration of the entire question of space by the UN has been delayed for more than a year by differences between the East and West in organizing a permanent committee for the purpose. The issue remains deadlocked.

Through IGY and COSPAR, scientists made the first effective proposals for satellite projects and created a most important precedent. The UN, on the other hand, has so far been frustrated in its efforts to contribute to international cooperation in space activities.

V

CONCLUSION

The foregoing should clearly demonstrate the substantive nature of the United States-NASA program which is stimulating the development of space research in nearly two dozen countries throughout the world, by:

1) Providing opportunities to foreign scientists to have their own experiments flown in our rockets and satellites.

2) Enlisting the talents and skills of scientists abroad in ground-based programs directly related to U.S. orbiting experiments (especially in the highly promising fields of communications and meteorological research by satellite).

3) Enabling foreign scientists and technicians to share in the operation of most U.S. global satellite tracking stations.

4) Opening up valuable training opportunities to foreign scientists in U.S. centers and universities for work directly connected with space research projects and operations.

This type of "hard" program is essential to international cooperation in space research. For, in this most advanced of technologies, technicians must carefully evaluate all proposals and provide for implementation of the feasible and useful ones through intimate associations, in order to meet the stringent requirements of systems compatibility.

Happily, the countries of Europe, stimulated by these opportunities and the broad technological and scientific challenges and obligations of space research, are now planning to organize substantive cooperative programs of their own. The United States welcomes these new centers of cooperation and will assist to the best of its ability in any sound scientific enterprises they may plan and in which they desire us to take part. This also holds true for Latin American and Pacific nations.

And what of the future?

NASA will continue to make available opportunities for joint projects, research, and training. New and promising international developments will follow from our communications and weather satellite programs, which are already in progress. Thus, the United States is making international cooperation in space a living fact. For the welfare of mankind, all practitioners of space research should do the same.

It is highly regrettable that opportunities for truly international cooperation in space research are hampered by the prevailing world political situation. The Soviet Union talks of the "advisability of international coordination of the efforts of all states and nations..." and suggests that "...it is natural and inevitable that the Soviet Union should rightly play the leading part in the international efforts in space research." Nevertheless, the USSR has increasingly subjected space activities to political opportunism, even attacking the completely open TIROS meteorological satellite program, although the USSR and other nations have been invited to share in TIROS cloud-cover data. Indeed, the USSR was invited to participate in the program.

In spite of the present state of affairs, NASA will continue its efforts to extend international cooperation to all nations, including the USSR. President Kennedy has pledged that "we are going to continue to attempt to engage the Soviet Union in a common (space) activity."

Science is one human activity that should be independent of political boundaries. Response to NASA's program of joint space research has proven that, if given the chance, men and women of different nations and varying social and political beliefs can collaborate scientifically with enthusiasm and with growing understanding.

(END)